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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UTILITY PATENT APPLICATION TRANSMITTAL LETTER

Atty./Agent Docket No.: CM03704H C01

Mailing Date: August 22, 2000

Express Mail Label No.: EK414665806US

Assistant Commissioner for Patents
Box Patent Application
Washington, D.C. 20231

Dear Sir:

Transmitted herewith for filing under 37 CFR 1.53 (b) is a Nonprovisional Utility Patent Application:
___New Application; or

__X__Continuation; or _____Divisional, or _____ Continuation-in-Part (CIP) Application of prior US application No.08/957,095, filed on October 24, 1997, having US Examiner Pham, B., in Group Art Unit 2731: of

Inventor(s): Korus, Michael

For (Title): METHOD AND APPARATUS FOR PROVIDING BROADCAST GROUP DATA

This transmittal letter has ___2___ total pages.

Enclosed are:

__X__ ___4___ sheets of drawings, along with ___23___ pages of specification, claims, and abstract. Copies from Parent Application.

__X__ Oath or Declaration Combined with Power of Attorney (___3___ pages)
_____ Newly Executed (original or copy)
__X__ Copy from a prior application (if this is a Continuation/Division with no new matter)
____Statement deleting named inventor(s) in prior application if this is a Continuation/Division (See 37 CFR 1.63(d)(2) and 1.33(b).)
____Consider as the above Statement, Please delete as inventors for this application the following inventors named in the prior application: _____

_____ Foreign priority to _____ Patent application having serial number _____, and a filing date of_____ is hereby claimed under 35 USC 119.
_____ A copy of the priority document is included herewith.

_____ An Assignment Transmittal Letter and Assignment of the invention to MOTOROLA, INC.

__X__ An Information Disclosure Statement (IDS), with ___1 page_____ PTO-1449. Copies available upon request.

__X__ Print EFS Inventor Information Sheet(s).

__X__ Return Receipt Postcard

__X__ Preliminary Amendment

_____ Please cancel filed claims _____.

_____ Incorporation by Reference (for Continuation/Division application) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered as being

part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

_____ Since the present application is based on a prior US application, please amend the specification by adding the following sentence before the first sentence of the specification: "The present application is based on prior US application No. 08/957,095, filed on October 24, 1997, which is hereby incorporated by reference, and priority thereto for common subject matter is hereby claimed."

__X__ The filing fee is calculated as follows:

CLAIMS AS FILED, LESS ANY CANCELED BY AMENDMENT

	NUMBER OF CLAIMS	NUMBER EXTRA	RATE	FEE
TOTAL CLAIMS	27 - 20 =	7	X $18	= $126.00
INDEPENDENT CLAIMS	6 - 3 =	3	X $78	= $234.00
MULTIPLE DEPENDENT CLAIMS			$260	= $ 0.00
			BASIC FEE	=$ 690.00
			TOTAL FILING FEE	=$ 1050.00

_____ Applicant hereby petitions pursuant to 37 C.F.R. §1.136(a) for a _____ month extension of time for response to the outstanding Official Action mailed _____. The period for response was previously set to elapse _____, and is accordingly hereby extended to _____, which is still within the six-month statutory period for response (35 U.S.C. § 133) which elapses _____. The reason for this petition is that a Division, Continuation, or CIP is being filed, and it is desired to maintain the present application in pending condition pursuant to 35 USC § 120 through at least the filing of the Division, Continuation, or CIP application. The required Extension Fee established by 37 CFR § 1.17(a) pursuant to 35 U.S.C. § 41(a) (8) is:

		RATE	FEE
	First Month	$110.00	
	Second Month	$380.00	
	Third Month	$870.00	
	Fourth Month	$1,360.00	
	Fifth Month	$1,850.00	

__X__ Please charge Deposit Account No. 13-4772 in the amount of $ 1050.00 for the Total Filing Fee, and the Extension Fee under 37 C.F.R. §1.136(a), if applicable.

__X__ The Commissioner is hereby authorized to charge any additional fees which may be required now or in the future under 37 CFR 1.16 or 37 CFR 1.17, including any present or future time extension fees which may be required, or credit any overpayment to Deposit Account No. 13-4772

__X__ One additional copy of this sheet is enclosed

Please forward all correspondence to:

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APPLICATION INFORMATION

Title Line One:: METHOD AND APPARATUS FOR PROVIDING BROAD
Title Line Two:: CAST GROUP DATA
Total Drawing Sheets:: 4
Formal Drawings?:: Yes
Application Type:: Utility
Docket Number:: CM03704H C01
Secrecy Order in Parent Appl.?:: No

REPRESENTATIVE INFORMATION

Representative Customer Number:: 22917

Source:: PrintEFS Version 1.0.1

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Michael Korus
EXAMINER: Pham, B.
PARENT SERIAL NO.: 08/957,095
GROUP: 2731
PARENT FILED: 10/24/97
CASE NO.: CM03704HC01
TITLED: METHOD AND APPARATUS FOR PROVIDING BROADCAST GROUP DATA

Motorola, Inc.
Corporate Offices
1303 E. Algonquin Road
Schaumburg, IL 60196
August 22, 2000

PRELIMINARY AMENDMENT UNDER 37 C.F.R. §1.111

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

In response to the Office Action dated March 15, 2000 (Paper No. 5) for the parent case of the present application, please enter the following response:

REMARKS

1. In the above-captioned Office Action, the Examiner objected to claims 3, 7, 9, and 16. Claim 5 was rejected under 35 U.S.C. §112, second paragraph. Claims 12 and 17 were rejected under 35 U.S.C. §102(b) in view of Tanaka et al. (U.S. Patent No. 4,998,245). Claims 1, 2, 4-6, 8, and 13-15 were rejected under 35 U.S.C. §103(a) given Tanaka in view of Fox et al. (U.S. Patent No. 5,636,216). Claims 19-26 were rejected under 35 U.S.C. §103(a) given Fox in view of Uppaluru (U.S. Patent No. 6,011,844). These rejections are traversed and reconsideration is hereby respectfully requested.

2. Some of the Examiner's rejections in the above-captioned Office Action are unclear and/or unspecified. Although the Examiner states that claims 1, 2, 4-6, 8, 10-15, and 17-26 are all rejected in the Office Action Summary, with respect to claims 10, 11, and 18, the Examiner simply states "Consider claims [number(s)] in view of [reference(s)]." It is unclear whether these are rejections or not. Because claims 10, 11, and 18 were discussed with respect to Tanaka and Fox, the Applicant is responding herein to those claims as if they were rejected under 35 U.S.C. §103(a) given Tanaka in view of Fox in order to advance the prosecution of this

application. In the event that these "considerations" were not intended to be rejections or different rejections were intended, the Applicant respectfully requests that the Examiner clearly and concisely state, in a non-final office action, the specific rejections, including the references and sections of 35 U.S.C., under which claims 10, 11, and 18 stand rejected.

3. Claim 5 was rejected under 35 U.S.C. §112, second paragraph. Claim 5 as filed herein is in compliance with 35 U.S.C. §112, second paragraph.

4. Claims 12 and 17 were rejected under 35 U.S.C. §102(b) in view of Tanaka. Prior to discussing the merits of the Examiner's position, the applicant believes it would be helpful to first briefly describe and characterize the Tanaka reference.

THE TANAKA REFERENCE

As stated in Tanaka:

> It is an object of the present invention to provide communication control method and an information transmission system for collectively transmitting and collecting information without individually sending the information of the same content to a plurality of communication control units when the same information is to be collectively sent to or collected by the plurality of communication control units [Column 3, lines 13-20].
>
> In order to achieve the above object, the information transmission system of the present invention comprises a bus type communication network which has an information transmission path for transmitting control information and at least two communication control units which communicate with each other through the information transmission path [Column 3, lines 21-28].

Tanaka therefore describes a system that utilizes a computer bus to broadcast a message to multiple units, through use of addressing and a protocol that Tanaka sets forth. Tanaka sets forth data formats and address formats used in sending data to particular types of devices, either individually or via broadcast messaging. Tanaka does not teach or suggest that a data service message includes a request for data, as described in independent claims 12 and 17. Further, Tanaka does not teach or suggest that a data service message is generated by a subscriber unit, as Tanaka's messages appear to be generated in the host computer, which is not a subscriber unit.

Furthermore, claims 13 and 18 are dependent upon an independent claim that is shown to be allowable. Thus, the dependent claims are themselves allowable.

5. Claims 1, 2, 4-6, 8, and 13-15 were rejected under 35 U.S.C. §103(a) given Tanaka in view of Fox. Prior to discussing the merits of the Examiner's position, the applicant believes it would be helpful to first briefly describe and characterize the Fox reference.

THE FOX REFERENCE

As stated in Fox:

> According to the invention, in a local network connected to other networks which employ and Internet Protocol and wherein the local network includes nodes which cannot monitor all other nodes connected to the local network, an Internet Protocol address of a target node connected to the local network is translated at a gateway node to a network specific local address of the target node ***without the use of broadcasting*** [Column 4, lines 25-32, emphasis added].
>
> Target node 18 is aware of its own IP address and its own network specific local address usable for forwarding a packet over local network 20 [Column 6, lines 2-4].
>
> FIG. 5 is a flowchart illustrating steps of a packet forwarding method according to the invention. By this method, a packet may be forwarded from source node 8, connected to originating local network 12, to target node 18 connected to destination local network 20. A record containing the network specific local address and IP address of target node 18 is created and stored at gateway node 14 according to one of the inventive address translation method depicted in FIGS. 3 and 4 [Column 6, lines 59-67].

Fox therefore describes a system that forwards packets of information through a gateway by using IP addresses and address translation methods set forth by Fox. The Examiner appears to suggest that Fox's target node is the same as a subscriber unit. Independent claims 1, 8, and 14 state that the data service message send by the subscriber unit include an identity of the subscriber unit and identity of a targeted host, in other words, the subscriber unit includes its own address and the identity of a targeted host, which is not the same as the subscriber. Since Fox describes that the targeted node exchanges only its own addresses (IP and network specific local from column 6, as shown above) with the gateway node in order to allow the targeted node and the gateway node to communicate, Fox's targeted

node does not meet the limitations set forth for a subscriber unit in independent claims 1, 8, and 14 that state that the subscriber unit's identity *and* that of a targeted host are sent to the gateway. Further, as Fox teaches away from broadcasting (as shown in column 4 as set forth above), combining Fox and Tanaka would not yield the invention as claimed, nor would one of skill in the art be motivated to combine these references. Hence, the applicant respectfully submits that independent claims 1, 8, and 14 may be passed to allowance.

The Examiner cites FIG. 7 and column 6, lines 52-67 of Tanaka as teaching the limitations of dependent claim 2. As set forth in Tanaka:

> The communication control units 1, 2 and 3 store the slave addresses to be received and processed in the memories 11, 21 and 31, respectively. [Column 6, lines 52-54].
>
> When the communication control unit 1 is to broadcast to the communication control units 2 and 3 having the same service group address, the communication control unit 1 generates the information message having the codes of the master address "1E0 (HEX)" and the slave address "9FF (HEX)" by the controller 12, and sends the start bit, master address, parity bit thereof, slave address and parity bit thereof from the communication controller 10 to the communication control units 2 and 3 through the information transmission line 4, as shown in FIG. 4 [Column 7, lines 1-11].

Tanaka therefore teaches *storing* of all the addresses, but sends only a master address and a slave address in Tanaka's information message, and thus does not send an identity of all targeted hosts. Fox makes no teachings on this issue. Dependent claim 2 states that the *data service message* further includes an identity of *all targeted hosts* operably coupled to a communication system to which the group of subscriber units is affiliated. Thus, the combination of Tanaka and Fox fails to teach the subject matter of claim 2.

Dependent claim 5 requires that the data service message includes a data request that requests data from the targeted host. It is known in the art that data requests request data, not just a communication channel (a channel request, such as an inbound signalling word (ISW) requests a channel). The Examiner sites Fox, Column 7, lines 1-18 as teaching a data request. Consistent with Fox's teachings of a packet forwarding method, this section of Fox teaches how a source node 8 forwards a packet across the blocks of FIG. 2, i.e., from the source node 8 through blocks 12, 10, 16, 14, and 20 to the target node 18. This process is not a request for data, but the rather the actual provision of the data. As stated above, Tanaka

does not teach data requests. Thus, the combination of Tanaka and Fox fails to teach data requests, and also fails to teach that a data service message includes a data request, as described in claim 5.

Furthermore, claims 2, 4-6, 10, 11, 13, 15, and 18 are dependent upon an independent claim that is shown to be allowable. For all these reasons, the dependent claims are themselves allowable.

6. Claims 19-26 were rejected under 35 U.S.C. §103(a) given Fox in view of Uppaluru. The Examiner cites the following excerpt from Fox as teaching all of claim 19, except that the requested data is forwarded via a communication resource that is supporting the audio call.

> The gateway node M thus determines the MAC address of the target node N using the ARP as follows. The gateway node M broadcasts over the LAN 4 an inquiry message containing the IP address of the target node N. The target node N then responds with a reply message containing as a matched pair both its own MAC address and its own IP address. The gateway node M stores the paired MAC address and IP address in a local routing table at the gateway node M. The packet may then be forwarded to the target node N by including the MAC address in a header of the packet. Packets received at the gateway node and addressed to the IP address of the target node are henceforth forwarded using the MAC address sorted in the local routing table at the gateway node [Column 2, lines 24-36].

Fox describes the storage of local (MAC) and IP addresses by gateway nodes to assist in finding a target node. When a gateway node is unaware of the local (MAC) address of a host node sends a message to other nodes looking for that local address (column 2, lines 16-20), by taking advantage of the Address Resolution Protocol as described in the above paragraph from Fox. Thus, Fox teaches that a gateway node requests a *local address* in order to forward a message to that address. Independent claim 19 describes receiving a request for data from a server, where the request for data comes from a communication unit *participating in an audio call*. Fox does not teach or suggest that an audio call is taking place, nor that a request for data takes place. Fox describes the routing of data, as sent in the network, but does not teach or suggest data requests nor data requests made by a communication unit participating in an audio call. Fox does not teach or suggest that either source nodes or data nodes participate in audio calls. Uppaluru makes no such teaching nor is Uppaluru relied on for such teachings. Thus, combining Uppaluru and Fox fails to teach or suggest receiving, from a

communication unit participating in an audio call with at least one other communication unit, a request for data from a server, as described in independent claim 19.

Fox teaches that a gateway is an address translator during one-way forwarding of data, i.e., source node 8 sends data to target node 18 via one or more gateway nodes. The gateway, B, obtains a local address and forwards a message, X, from a source node, A, to an intended target node, C, i.e., message X goes from point A to point B to point C. The present invention claims, that a gateway, B, receives a request, Y, from a requestor, C, forwards it to a server, A, receives the requested data, X, then forwards the requested data to the requestor, C, i.e., message Y goes from point C to point B to point A **and** X goes from point A to point B to point C, or a two-way process. Assuming for the sake of argument that Fox's process of forwarding message X from point A to point B to point C is the same as the forwarding by the present invention, Fox fails to teach *half* of the path where request message Y goes from point C to point B to point A. Uppaluru is not relied on nor does Uppaluru provide such teachings. Thus, combining Uppaluru and Fox fails to teach or suggest receiving, from a communication unit participating in an audio call with at least one other communication unit, a request for data from a server and forwarding, to the server, the request for data, as described in independent claim 19.

Further, as the Examiner points out, Fox fails to provide the data to the requestor on a communication resource that is supporting the audio call, as described in independent claim 19. The Examiner relies on the Uppaluru reference for such teachings. Prior to discussing the merits of the Examiner's position, the applicant believes it would be helpful to first briefly describe and characterize the Uppaluru reference.

THE UPPALURU REFERENCE

As stated in Uppaluru:

> In general, embodiments described below feature a global call center system capable of answering, servicing, queuing and routing of calls at local points of presence to reduce communications costs and enhance operational efficiency for toll-free inbound call centers. In at least one embodiment, the global call center system includes a set of point-of-presence call center gateways distributed at points of presence close to the point of call origination that are interconnected by a virtual private network to premises call center gateways at business locations where the call centers reside [Column 2, lines 32-42].

Uppaluru therefore describes a system that provides for various advanced calling services and routing of toll-free wireline audio calls, as shown in FIG. 3. Uppaluru does not teach or suggest that requested data is forwarded on communication resources that support an audio call, nor requests for data. Because Uppaluru teaches audio calls and Fox teaches data transmission, combining these references does not teach or suggest the ability to forward data on resources that support audio calls. Such a combination requires further teaching to yield the invention as claimed, and such teachings have not been set forth in any of the cited references, but rather such teachings are found in the present application. Thus, neither Fox, Uppaluru, nor their combination teaches or suggests the subject matter of claim 19.

With respect to dependent claim 27, neither Fox nor Uppaluru teaches or suggests group data broadcast.

Thus, the claims of the present invention are not taught or suggested by Uppaluru and/or Fox. Combining these references fails to teach or yield the invention as claimed. The Examiner has fails to provide the teachings necessary to fill the gaps in these references in order to yield the invention as claimed. Further, one of skill in the art would not be motivated to make such a combination because these references fail to yield the claimed invention even if combined. Therefore, the present invention is not obvious in light of any combination of Uppaluru and/or Fox.

Furthermore, claims 20-27 are dependent upon an independent claim that is shown to be allowable. For all these reasons, the dependent claims are themselves allowable.

5. The Examiner is invited to contact the undersigned by telephone or facsimile if the Examiner believes that such a communication may advance the prosecution of the present application. Notice of allowance of claims 1-27 is hereby respectfully requested.

Respectfully submitted,

Michael Korus

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METHOD AND APPARATUS FOR PROVIDING BROADCAST GROUP DATA

Cross Reference to Related Applications

This application is a continuation of commonly-assigned U.S. Application Serial No. 08/957,095, titled "METHOD AND APPARATUS FOR PROVIDING BROADCAST GROUP DATA" and filed on October 24, 1997 on behalf of the same inventor of the present application, the disclosure of which prior application is hereby expressly incorporated by reference, verbatim, and with the same effect as though such disclosures were fully and completely set forth herein.

Field of the Invention

This invention relates generally to data communications, including but not limited to broadcast group data communications within a communications system.

Background of the Invention

Communication systems are known to include controlling infrastructure and end-user equipment, also known as subscriber units or communication units, such as mobile and portable communication units. The controlling infrastructure may be a wire-line controlling infrastructure such as a local area network, a wide area network, the public switching telephone network (PSTN), the Internet, and so forth. In a wireline system, subscriber units are personal computers, workstations, personal agents, and any other telephone

devices, facsimile machines, and so forth. Alternatively, the controlling infrastructure may be for a wireless communications system wherein the controlling infrastructure includes a zone controller or system controller, site controllers or base station controllers, base stations, and a plurality of communication channels. In a wireless system, the subscriber units may be land mobile radios, cellular telephones, pagers, personal computers equipped with wireless transceivers, and personal digital assistants equipped with wireless transceivers.

In a wireless system, which may be a digital system or analog system, the subscriber units may transceive voice information and/or data information. To transceive voice information, an initiating subscriber unit transmits an inbound signaling word (ISW) to the controlling wireless infrastructure, wherein the ISW is requesting access to a voice channel. The request may be for a one-to-one communication, such as a typical telephone call, or a one-to-many communication such as a group call. Upon receiving the inbound signaling word, the controlling wireless infrastructure determines whether the requesting subscriber unit is authorized to make such a request and whether the request can be accommodated. To determine whether the requesting subscriber unit is authorized to make the particular request, the controlling infrastructure accesses a home location register (HLR) to determine which services the requesting subscriber unit has subscribed to. If the HLR indicates that the requesting subscriber unit is authorized to make such a request, the request will be granted. To determine whether the request can be fulfilled, the controlling wireless infrastructure determines whether a wireless communication channel is available in the site of the requesting subscriber unit. The wireless controlling infrastructure also determines whether communication channels are available in other sites in which targeted subscriber units (i.e., subscriber units that are identified as a recipient of the communication) are located.

If a subscriber unit involved in a digital voice communication desires to request data, the subscriber unit must leave any voice communication it is

involved in (i.e., de-affiliate from the voice channel supporting the voice communication) and return to the control channel. Once affiliated with the control channel, the subscriber unit transmits an inbound signaling word requesting the data. If the request is to be fulfilled, the subscriber unit receives, via the control channel, an outbound signaling word, which indicates a data channel. The subscriber unit then affiliates with the data channel to receive the requested data. While the subscriber unit is awaiting its data request to be fulfilled, it misses potentially vital information because it is no longer affiliated with the voice communication.

For example, assume that a group of police officers are involved in a group communication responding to an emergency situation. Based on the facts surrounding the emergency situation, one of the officers involved desires additional data that needs to be shared with the group of officers involved in the emergency situation. To obtain this data, the requesting subscriber unit operated by the police officer would have to disengage from the voice channel, return to the control channel to request the data and then affiliate with a data channel to receive the data. Since only the requesting officer would receive the data, the officer must return to the talk group channel and verbally communicate the received data.

Therefore, a need exists for a method and apparatus that allows subscriber units to request and receive data for itself and/or for its group without having to leave a voice communication.

Brief Description of the Drawings

FIG. 1 illustrates a block diagram of a communications system in accordance with the present invention;

FIG. 2 illustrates a block diagram of a data gateway and subscriber unit in accordance with the present invention;

FIG. 3 illustrates a flowchart of a method for providing group data broadcasts in accordance with the present invention; and

FIG. 4 illustrates a flowchart of a method for maintaining group data broadcasts in accordance with the present invention.

Description of a Preferred Embodiment

Generally, the present invention provides a method and apparatus for providing broadcast group data within a communication system. This begins when a subscriber unit provides a data service message to a data gateway. The data service message includes identity of a subscriber unit, a data selection, and identity of a targeted host (e.g., the computer that stores the requested data). Upon receiving the data service message, the data gateway interprets it to determine whether the data selection is for an individual data broadcast or group data broadcast. When the data service message is for a group data broadcast, the data gateway temporarily stores the identity of the subscriber unit and the identity of the targeted host. Having done this, anytime the data gateway receives data destined for the subscriber unit (while it is involved in voice communication), the data gateway forwards the data to the subscriber unit and other subscriber units that are currently involved in a group voice call with the requesting subscriber unit. With such a method and apparatus, a subscriber unit may request data for itself and/or for its group without having to de-register from the voice channel, affiliate itself with the control channel, and then affiliate with a data channel.

The present invention can be more fully described with reference to FIGS. 1 through 4. FIG. 1 illustrates a block diagram of a communications system 10 that includes a data gateway 12, a zone controller 14, a plurality of sites 16-20, and a plurality of host computers 22-26. The site identified by reference numeral 16 is shown as a wireless communications site that

includes a site controller 32, a plurality of base stations 34, 36, a plurality of wireless communications channels 44, 46, and a plurality of subscriber units 38-42. The subscriber units 38-42 may be mobile/portable radios, pagers, personal digital assistants with an RF (radio frequency) transceiver, personal computers with an RF transceiver, cell telephones, or any other device that can transceive information via an RF transmission path 48.

Preferably, each of the subscriber units 38-42 has an individual Internet Protocol (IP) address such that it can communicate, via the data gateway, with the host computers 22-26 to obtain data. However, it is understood that other addressing schemes could also be used. To make a request for data while involved in a voice communication channel, the subscriber unit selects whether the data responses from the targeted host should be sent to the requesting subscriber unit or to the group of subscriber units involved in voice communication. This selection results in the creation of a data service message that contains the requesting subscribers ID (e.g., an Internet Protocol (IP) address), the targeted host's ID, and an indication of individual or group response, which is transmitted over the voice communication channel. The data service message can be sent to the data gateway as a stand-alone packet or it can be sent embedded or concatenated with a data packet. If the data service message is embedded or concatenated with a data packet, the data gateway extracts the data service message and forwards only the data packet to the targeted host. For example, a subscriber unit may construct a data frame by appending a data service message to a data packet (e.g. a license plate look-up request). Upon receiving the data frame, the data gateway removes the data service message and forwards data packet to the target host. As one of average skilled in the art will readily appreciate this is one example of many possible ways in which a communication system can identify a data request from a subscriber unit. Note that the request may also be made over an analog communication channel using sub-audible data signaling or other embedded data signaling technique.

A suitable platform for a data gateway 12 is a personal computer, workstation, or other device that manipulates digital information based on programming instructions and that is capable of providing communications between the communication system 10 and the PSTN, the Internet, or any other public or private communication infrastructure. Upon receiving the subscriber unit's data service message, the data gateway 12 interprets it to determine whether the data service message is for individual data or group data broadcast. If the data service message is for an individual, the data gateway 12 passes data inquiries and data responses between the subscriber unit and the targeted host 22-26 without any modifications to the identity of the subscriber unit.

If, however, the data service message indicates a group data broadcast, i.e., if each of the subscriber units involved in a group communication are to receive the data destined for the requesting subscriber, the data gateway 12 stores the identity of the requesting subscriber unit and the identity of the targeted host. Next, the data gateway 12 provides data requests to the targeted host 22 - 26, which processes the requests and returns the requested data to the data gateway 12. The returned data includes a header and the data, where the header includes the identity of the host and the identity of the requesting subscriber unit. Upon receiving the requested data, the data gateway 12 reads the header to ascertain the identities of the requesting subscriber unit and the targeted host. When the header information matches the information it has stored in temporary memory (e.g., cache memory), the data gateway replaces the identity of the subscriber unit with a broadcast address and recalculates checksums and/or other ancillary values associated with the specific protocols in use. The data gateway 12 then provides the returned data to the group of subscriber units. Note that the broadcast address is an IP address that is recognizable by a group of subscriber units.

The group of subscriber units include a plurality of subscriber units, one of which is the requesting subscriber unit, that are affiliated with each other

based on a one-to-many communication occurring over a single communication channel. The group may be pre-established based on functionality of the users (e.g., police officers of a precinct, taxicab drivers, fire department personnel, and so forth) or may be established on an ad hoc manner based on the nature of the communication. The group's identity is maintained by the zone controller 14, which may be a personal computer, workstation, or other device that manipulates digital information based on programming instructions. For example, the zone controller 14 may be a zone controller manufactured by Motorola for its ASTRO product line.

As further shown in FIG. 1, site 20 includes a plurality of computers 28, 30, which, for the purposes of this discussion, are considered to be subscriber units. In this regard, the computers request data from the host computers 22-26, via the data gateway 12, in a similar manner as the wireless communication devices of site 16. As such, a computer 28, 30 may initiate a data broadcast that is an individual data broadcast (i.e., unicast) or a group data broadcast. For group data broadcasts, the computer 28, 30 sends a data service message indicating group data broadcast. A subsequent data packet containing a request (or concatenated with the data service message) is sent to the data gateway 12, which processes the data request as previously described. Note that the computers may be grouped based on a functional relationship, such as members of an accounting department, engineering department, and so forth. Alternatively, the operator of the requesting computer 28, 30 may establish the group. By programming the data gateway 12 to process broadcast group data in the manner just described and as further described below with reference to FIGS. 3 and 4, a subscriber unit can access data without having to leave a group communication, and the data that the subscriber unit retrieves can be provided to the group.

FIG. 2 illustrates a block diagram of the data gateway 12 and subscriber units 28-30 and 38-42. The data gateway 12 includes a processing unit 52 and memory 50. The memory 50, which may be a read-only memory,

random access memory, floppy disk, hard drive, magnetic tape, or any other means for storing digital information, stores programming instructions that, when read by a processing unit, cause the processing unit to function as a plurality of circuits. The processing unit 52, which may be a microprocessor, microcontroller, central processing unit, digital signal processor or any other device that manipulates digital information based on programming instructions, executes the programming instructions stored in memory 50.

While executing the programming instructions stored in memory 50, the processing unit 52 functions as a circuit 54 to receive data service messages. The data service messages 75 and 78 may come in any of at least two forms. The data service message 75 may be fragmented such that the data gateway receives a message indicating that the subscriber unit has selected group data broadcasts from a specific target host, a plurality of targeted hosts, or all of the targeted hosts coupled to the communication system 10. Thus, for any subsequent data request message 74 addressing a targeted host(s), the data gateway broadcasts the data to the group of subscribers on the voice communication channel. The group data broadcast mode may automatically end after each fulfillment of the data request or when the subscriber unit transmits an individual data unicast message to the data gateway 12. Alternatively, the data service message may have the format of the message identified by reference numeral 78 embedded, concatenated, or appended to a data packet (e.g. a data request message 74). In this format, the data service message would include the identity of the subscriber unit, an indication that group data broadcast has been selected, the identity of the host computer, and a data request.

Regardless of the format of the data service message, the processing unit 52 interprets the message to identify the group broadcast request. Having done this, the processing unit 52 functions as a circuit 56 to store the identities of the subscriber unit and the targeted host computer. Having done this, the processing unit 52 then functions as a circuit 58 to route subsequent data requests and responses between the targeted host computer and

subscriber unit(s). A message 80 is sent to the targeted host computer that includes the identity of the subscriber unit, the identity of the targeted host and the request for data.

The host computer 22 - 26, upon receiving and processing the data packet 80 (e.g. request), responds with a data message 82. The data message 82 includes the identity of the subscriber unit, the identity of the targeted host computer, and the requested data. The processing unit 52 then functions as a circuit 60 to receive the requested data from the targeted host computer. Next, the processing unit 52 functions as a circuit 62 to provide the requested data to the group of subscriber units. To do this, the processing unit generates a group message 84 that includes a broadcast identity and the requested data. In other words, the data gateway 12 replaces the individual identity of the subscriber unit with a broadcast address.

The subscriber unit 28-30 and 38-42 include memory 64 and a processing unit 66. The memory 64--which may be a read-only memory, random access memory, floppy disk memory, hard disk memory, or any other means for storing digital information--stores programming instructions that, when executed by a processing unit, cause the processing unit to function as a plurality of circuits. The processing unit 66--which may be a microprocessor, microcontroller, digital signal processor, central processing unit, or any other device that manipulates digital information based on programming instructions--executes the programming instructions stored in the memory 64 to function as the plurality of circuits.

While executing the programming instructions stored in memory 64, the processing unit 66 functions as a circuit 68 to receive input for data service messages. The input is received from an operator of the subscriber unit via an input mechanism such as a keypad, keyboard, display menu, and so forth. Next, the processing unit 66 functions as a circuit 70 to generate a data service message 70. The data service message may be generated in the forms described above. Having generated the message, the processing unit

66 then functions as a circuit 72 to provide the message to the data gateway. Note that the interoperable functionality of circuits 54-62 of the processing unit 52 of data gateway 12 and the circuits 68-72 of the processing unit 66 of the subscriber units 28, 30, 38-42 will be described in greater detail with reference to FIGS. 3 and 4.

FIG. 3 illustrates a flowchart of a method for providing broadcast group data. The process begins at step 90 where a subscriber unit provides a data service message to a data gateway. This was previously discussed with reference to FIG. 2. The process then proceeds to step 92 where the data gateway interprets the message to determine whether the message is for an individual data broadcast (i.e., a unicast) or a group data broadcast. At step 94, the flow of the process proceeds to step 96 when the message is for a unicast, and proceeds to step 100 when the message is for a group data broadcast. At step 96, the data gateway determines if the previous mode for the subscriber/Host pair was group broadcast. If so, step 97 is invoked to update the data gateway memory to reflect the unicast selection. The process then proceeds to step 98 where, after the data is received from the targeted host, the data gateway provides the data to the requesting subscriber unit in accordance with well-known transmission techniques.

When group data broadcast is selected, the data gateway temporarily stores (e.g., in cache memory) the identities of the subscriber unit and the targeted host at step 100. The process then proceeds to step 102 where the data gateway receives data from the targeted host. Note that to receive the data, the data gateway had to previously provide a representation of the request message to the targeted host computer, where the representation includes, at least, the identity of the subscriber unit and the data request. The process then proceeds to step 106 where a determination is made as to whether the targeted host and subscriber unit are verified. To verify the host and subscriber unit, the data gateway compares the identities of the host and subscriber unit contained within the received data with the identities of the host and subscriber unit stored in its cache memory. If the host or the

subscriber unit is not verified, the process is complete for this particular data session. This process of verification prevents unsolicited data from being broadcast.

If, however, the host and subscriber unit are verified, the process proceeds to step 108 where the data gateway provides the data to a group of subscriber units over the communication channel that is currently supporting the group voice communication. Providing the data to the group is done by replacing the identity of the subscriber unit with the identity of the group (i.e. broadcast address) prior to the transmission. For example, the IP address of the subscriber unit would be replaced with a generic IP address for all subscriber units. As such, any subscriber unit involved in the group communication will receive the data.

FIG. 4 illustrates a flowchart of a method for further processing broadcast group data. The process begins at step 110 where a group of subscriber units is determined based on an active group call. As previously mentioned, a subscriber unit may be involved in a voice communication with its group, where the group is pre-established based on commonality of function or the group may be selected by the subscriber unit. Regardless of how the group is established, the process proceeds to step 112. At step 112, a determination is made by the data gateway as to whether the requested data has been received. Note that this step assumes that steps 90 through 100 of FIG. 3 have been executed.

If the data has not yet been received, the process proceeds to step 114 where a determination is made as to whether the group maybe disbanding prior to receiving the data (i.e., the group has begun to end the group call and relinquishing the voice communication channel). If this condition exists the process proceeds to step 118, where the data gateway and/or the zone controller maintains the group until the data is received.

Once the data is received, the process proceeds to step 116 where the data gateway compares the stored identities of the subscriber unit and the targeted host with the identities of the subscriber unit and targeted host contained within the requested data message. The process then proceeds to step 120 where a determination is made as to whether the comparison was favorable. A favorable comparison would indicate that the identities temporarily stored in cache memory substantially match the identities contained within the message. If the comparison was not favorable, the process is complete for this particular data request. If, however, the comparison was favorable, the process proceeds to step 122 where the data is provided to the group of subscriber units.

The preceding discussion has presented a method and apparatus for providing broadcast group data in a communications system. Such a method and apparatus have particular application in a digital wireless communication system where a subscriber unit no longer has to de-affiliate from a group communication to retrieve data, nor will the requested data only be made available to the requesting subscriber unit. In accordance with the present invention, the data gateway processes data requests from subscriber units such that the data is distributed as requested by the subscriber unit. Such distribution may be to the subscriber unit only or to a group of subscriber units.

Although the present invention has been described with reference to certain preferred embodiments, numerous modifications and variations can be made by those skilled in the art without departing from the novel spirit and scope of the present invention.

What is claimed is:

Claims

1. A method for providing broadcast group data, the method comprising the steps of:

providing, by a subscriber unit, a data service message to a data gateway, wherein the data service message includes identity of the subscriber unit and identity of at least one targeted host;

determining, by the data gateway, that the data service message is for group data broadcast;

when the data service message is for the group data broadcast, temporarily storing, by the data gateway, the identity of the subscriber unit and the identity of the at least one targeted host;

receiving, by the data gateway, data from a targeted host of the at least one targeted host; and

when the identity of the targeted host is verified, providing, by the data gateway, the data to a group of subscriber units, wherein the subscriber unit is included in the group of subscriber units.

2. The method of claim 1, wherein the data service message further includes an identity of all targeted hosts operably coupled to a communication system to which the group of subscriber units is affiliated.

3. The method of claim 1, wherein the data includes the identity of the subscriber unit and the identity of the targeted host and the method further comprises the steps of:

comparing the identities of the subscriber unit and the targeted host contained in the data with the identities of the subscriber unit and targeted host that are temporarily stored;

when the comparing is favorable, replacing the identity of the subscriber unit with a broadcast address.

4. The method of claim 1, wherein the data service message includes an Internet protocol address as the identity of the subscriber unit.

5. The method of claim 1, wherein the data service message further includes a data request that requests data from the targeted host, and wherein the method further comprises the step of receiving, by the data gateway, the data from the targeted host in response to the data request.

6. The method of claim 1, wherein the method further comprises the steps of:

providing a data request subsequent to providing the data service message, wherein the data request identifies the targeted host; and

receiving, by the data gateway, the data from the targeted host in response to the data request.

7. The method of claim 1, further comprising the steps of:

determining the group of subscriber units based on an active group communication; and

when the active group communication would end prior to receiving the requested data, maintaining the group of subscriber units until the requested data is received.

8. A method for a data gateway to process broadcast group data, the method comprising the steps of:

receiving a data service message from a subscriber unit, wherein the data service message includes an identity of the subscriber unit and identity of a targeted host;

temporarily storing the identity of the subscriber unit and the identity of the targeted host when the data service message is for a group data broadcast;

routing, on behalf of the subscriber unit, a data request message toward the targeted host;

receiving data from the targeted host; and

when the identity of the targeted host is verified, providing the data to a group of subscriber units, wherein the group of subscriber units includes the subscriber unit.

9. The method of claim 8, wherein further comprising the steps of:

receiving the data that includes the identity of the subscriber unit and the identity of the targeted host;

comparing the identities of the subscriber unit and the targeted host contained in the data with the identities of the subscriber unit and targeted host that are temporarily stored;

when the comparing is favorable, replacing the identity of the subscriber unit with a broadcast address.

10. The method of claim 8, further comprising the step of receiving the data service message and the data request message contemporaneously.

11. The method of claim 8, further comprising the step of receiving the data request message subsequent to receiving the data service message.

12. A method for a subscriber unit to participate in broadcast group data, the method comprising the steps of:

generating, by the subscriber unit, a data service message that includes an identity of the subscriber unit, an identity of a targeted host, a request for data, and an indication of group data broadcast; and

providing the data service message to a data gateway.

13. The method of claim 12, further comprising the step of generating the data service message to include a concatenated data request message based on the request for data and the identity of the targeted host.

14. A data gateway comprising:

a processing unit; and

memory that stores programming instructions that, when read by the processing unit, causes the processing unit to function to: receive a data service message from a subscriber unit, wherein the data service message includes an identity of the subscriber unit and an identity of a targeted host; store the identity of the subscriber unit and the identity of the targeted host when the data service message is for a group data broadcast; route a data request message to the targeted host; receive data from the targeted host; and provide the data to a group of subscriber units, wherein the group of subscriber units includes the subscriber unit when the identity of the targeted host is verified.

15. The data gateway of claim 14, wherein the memory further comprises programming instructions that, when read by the processing unit, causes the processing unit to function to:

receive the data service message that includes the data request message; and

separate the data request message from the data service message.

16. The data gateway of claim 14, wherein the memory further comprises programming instructions that, when read by the processing unit, causes the processing unit to function to:

receive the data, including the identity of the subscriber unit and the identity of the targeted host;

compare the identities of the subscriber unit and the targeted host contained in the data with the identities of the subscriber unit and targeted host that are temporarily stored;

when the comparing is favorable, replace the identity of the subscriber unit with a broadcast address.

17. A subscriber unit comprising:

a processing unit; and

memory that stores programming instructions that, when read by the processing unit, causes the processing unit to function to: receive an input for a group data broadcast; generate a data service message that includes an identity of the subscriber unit, an identity of at least one targeted host, a request for data, and an indication of a group data broadcast; and provide the data service message to a data gateway.

18. The subscriber unit of claim 17, wherein the memory further comprises programming instructions that, when read by the processing unit, causes the processing unit to function to:

receive a data input contemporaneously with receiving the input for the group data broadcast, wherein the data input includes a request for data and identifies a targeted host of the at least one targeted host; and

generate the data service message to include a concatenated data request message based on the request for data and the identity of the targeted host.

19. A method comprising the steps of:

receiving, from a communication unit participating in an audio call with at least one other communication unit, a request for data from a server;

forwarding, to the server, the request for data;

receiving, from the server, the requested data;

forwarding, to the communication unit, the requested data via a communication resource that is supporting the audio call.

20. The method of claim 19, further comprising the step of forwarding, to the at least one other communication unit, the requested data via the communication resource that is supporting the audio call.

21. The method of claim 19, wherein the method is performed by a data gateway.

22. The method of claim 19, wherein the request is sent on the communication resource supporting the audio call.

23. The method of claim 19, wherein the request is at least part of a message.

24. The method of claim 19, wherein the request forms an entire message.

25. The method of claim 19, wherein the request comprises an identity of the server.

26. The method of claim 25, further comprising the step of verifying the identity of the server prior to the forwarding step.

27. The method of claim 19, wherein the request indicates group data broadcast of the requested data.

METHOD AND APPARATUS FOR PROVIDING BROADCAST GROUP DATA

Abstract of the Disclosure

A method and apparatus for providing broadcast group data within a communication system begins when a subscriber unit (28 – 32, 38 – 42) provides a data service message to a data gateway (12). The data service message includes identity of a subscriber unit, a data selection, and identity of at least one targeted host (e.g., a computer that stores the requested data) (22 – 26). Upon receiving the data service message, the data gateway (12) interprets it to determine whether the request is for an individual data broadcast or group data broadcast. When the data broadcast is for a group data broadcast, the data gateway temporarily stores the identity of the subscriber unit and the identity of the targeted host. Having done this, the data gateway (12) obtains the data from the targeted host and provides it to the requesting subscriber unit and other subscriber units that are currently involved in a group voice call with the requesting subscriber unit.

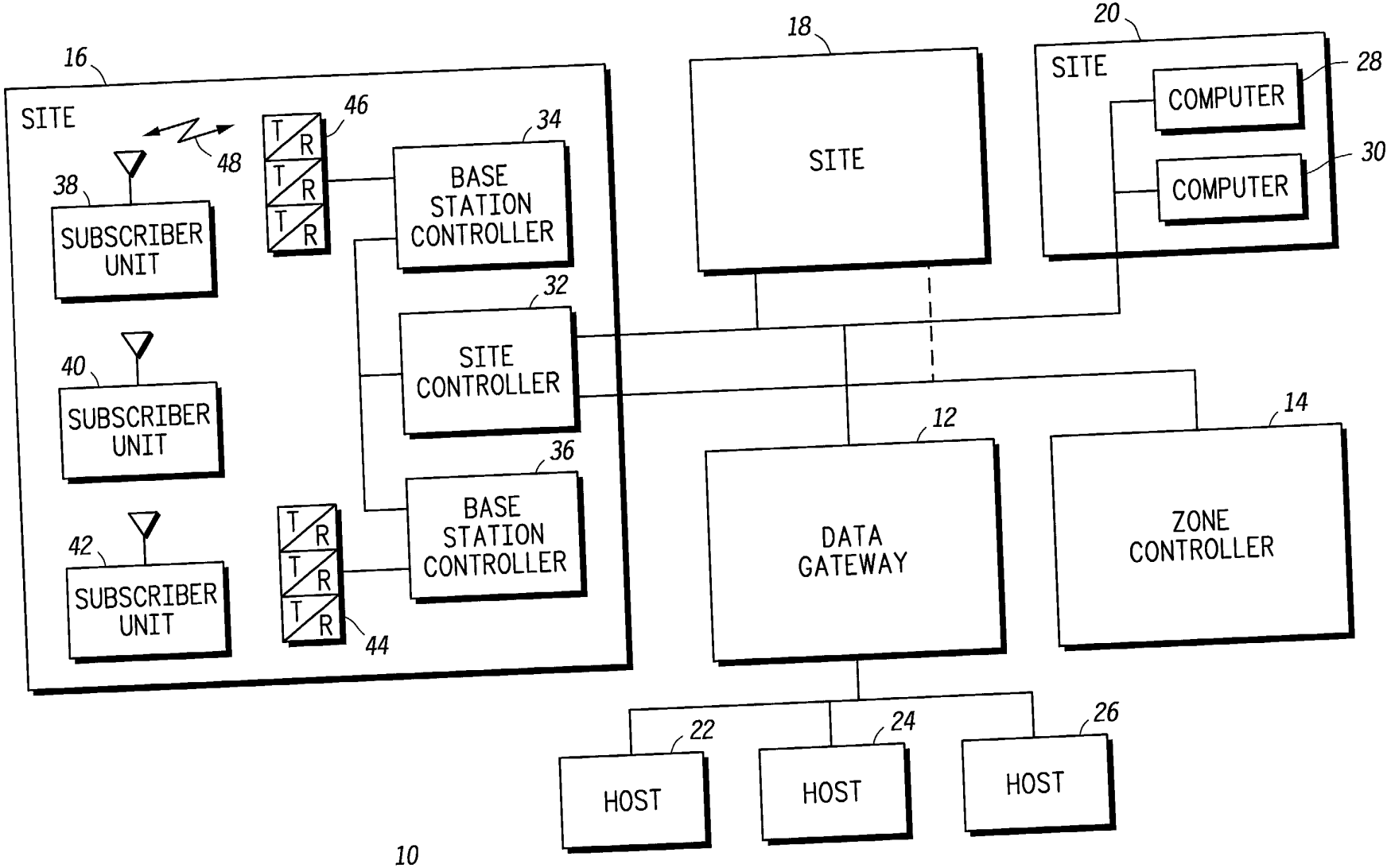
16
SITE
38
SUBSCRIBER UNIT
40
SUBSCRIBER UNIT
42
SUBSCRIBER UNIT
48
T R
T R
T R
46
34
BASE STATION CONTROLLER
32
SITE CONTROLLER
36
BASE STATION CONTROLLER
T R
T R
T R
44
18
SITE
20
SITE
COMPUTER
28
COMPUTER
30
12
DATA GATEWAY
14
ZONE CONTROLLER
22
HOST
24
HOST
26
HOST
10

FIG.1

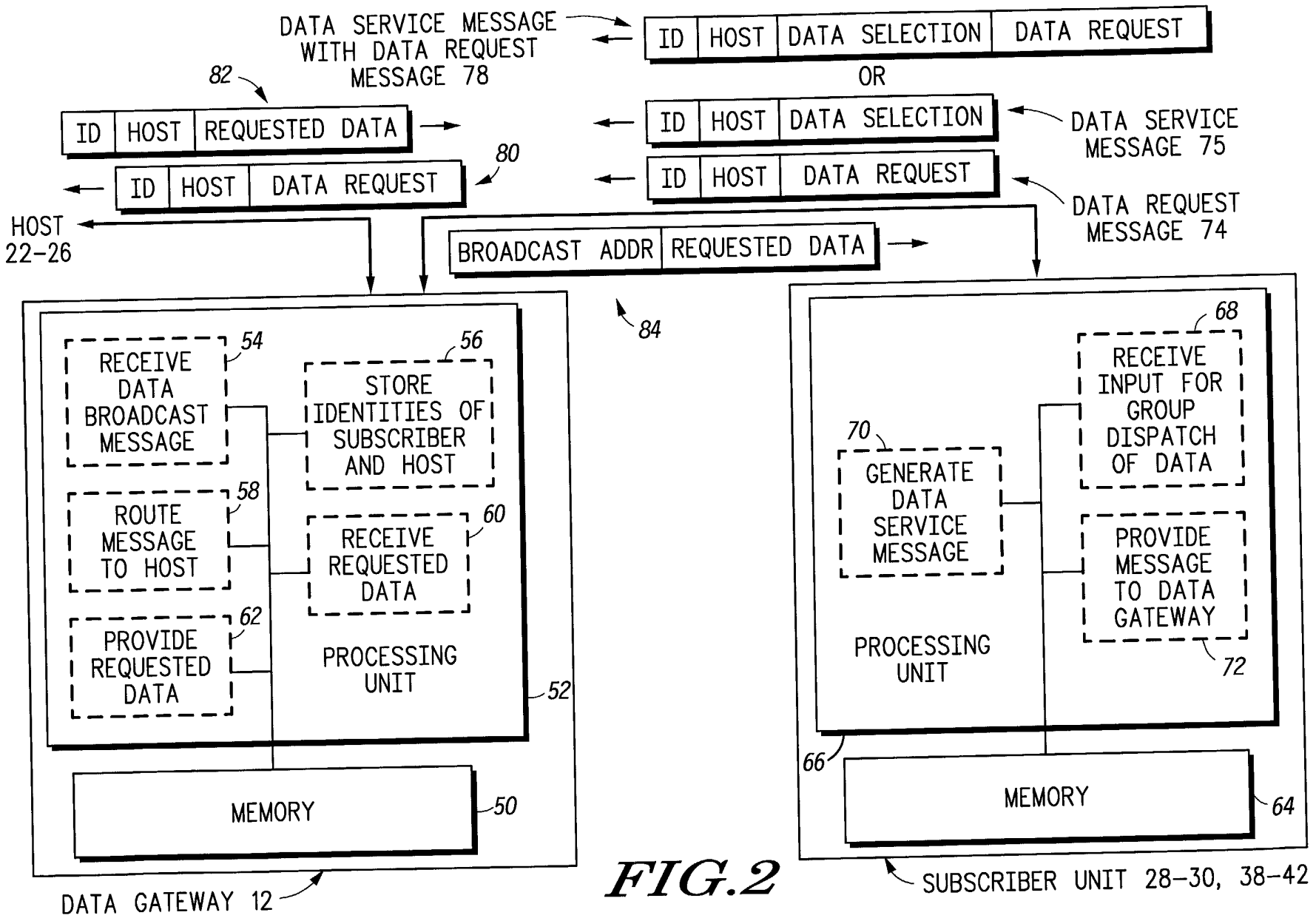
DATA SERVICE MESSAGE WITH DATA REQUEST MESSAGE 78
ID HOST DATA SELECTION DATA REQUEST
OR
ID HOST DATA SELECTION
DATA SERVICE MESSAGE 75
ID HOST DATA REQUEST
DATA REQUEST MESSAGE 74
82
ID HOST REQUESTED DATA
80
ID HOST DATA REQUEST
HOST 22-26
BROADCAST ADDR REQUESTED DATA
84
RECEIVE DATA BROADCAST MESSAGE
54
STORE IDENTITIES OF SUBSCRIBER AND HOST
56
ROUTE MESSAGE TO HOST
58
RECEIVE REQUESTED DATA
60
PROVIDE REQUESTED DATA
62
PROCESSING UNIT
52
MEMORY
50
DATA GATEWAY 12
RECEIVE INPUT FOR GROUP DISPATCH OF DATA
68
GENERATE DATA SERVICE MESSAGE
70
PROVIDE MESSAGE TO DATA GATEWAY
72
PROCESSING UNIT
66
MEMORY
64
SUBSCRIBER UNIT 28-30, 38-42

FIG.2

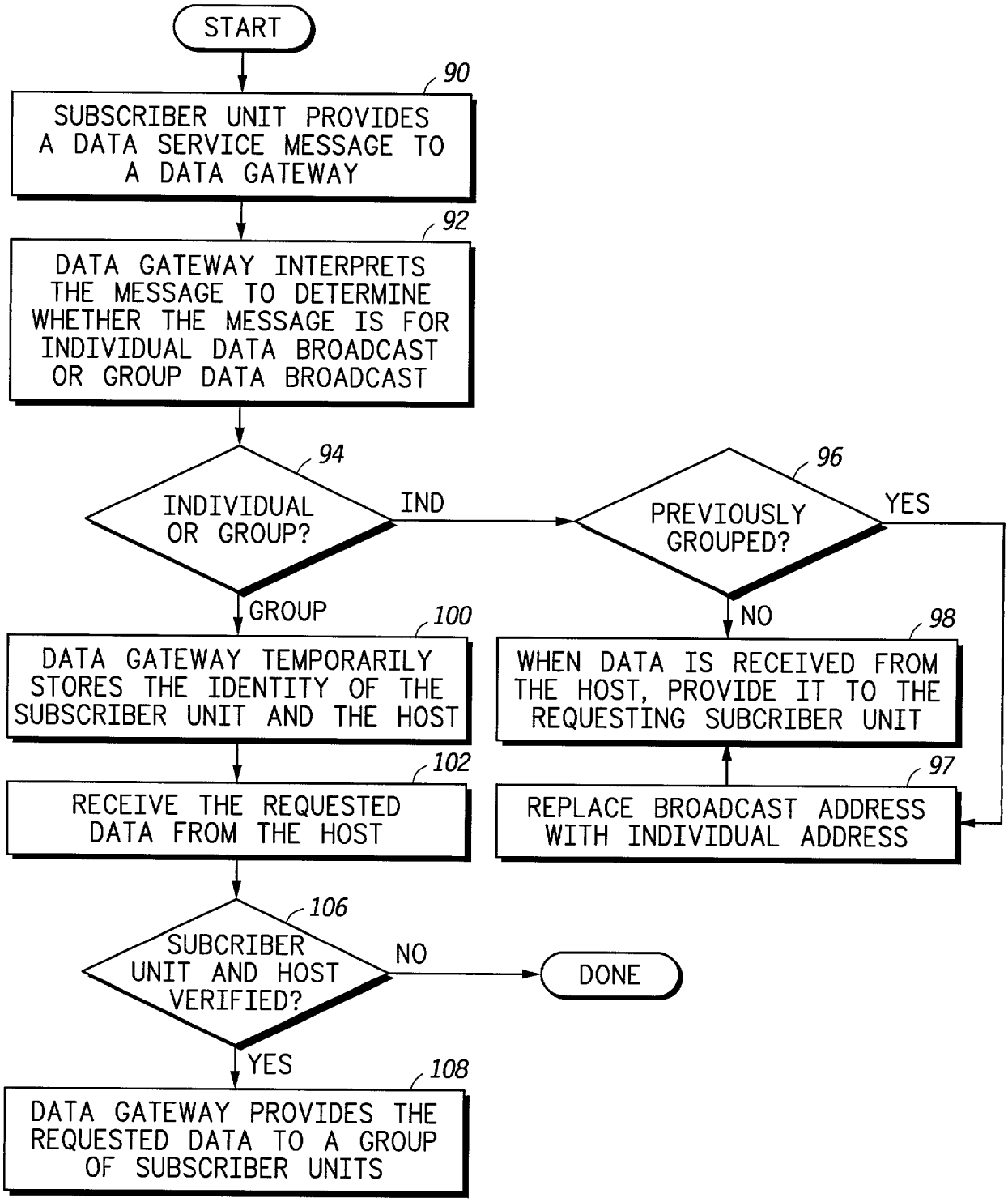
START
90
SUBSCRIBER UNIT PROVIDES A DATA SERVICE MESSAGE TO A DATA GATEWAY
92
DATA GATEWAY INTERPRETS THE MESSAGE TO DETERMINE WHETHER THE MESSAGE IS FOR INDIVIDUAL DATA BROADCAST OR GROUP DATA BROADCAST
94
INDIVIDUAL OR GROUP?
IND
96
PREVIOUSLY GROUPED?
YES
GROUP
NO
100
DATA GATEWAY TEMPORARILY STORES THE IDENTITY OF THE SUBSCRIBER UNIT AND THE HOST
98
WHEN DATA IS RECEIVED FROM THE HOST, PROVIDE IT TO THE REQUESTING SUBCRIBER UNIT
102
RECEIVE THE REQUESTED DATA FROM THE HOST
97
REPLACE BROADCAST ADDRESS WITH INDIVIDUAL ADDRESS
106
SUBCRIBER UNIT AND HOST VERIFIED?
NO
DONE
YES
108
DATA GATEWAY PROVIDES THE REQUESTED DATA TO A GROUP OF SUBSCRIBER UNITS

FIG.3

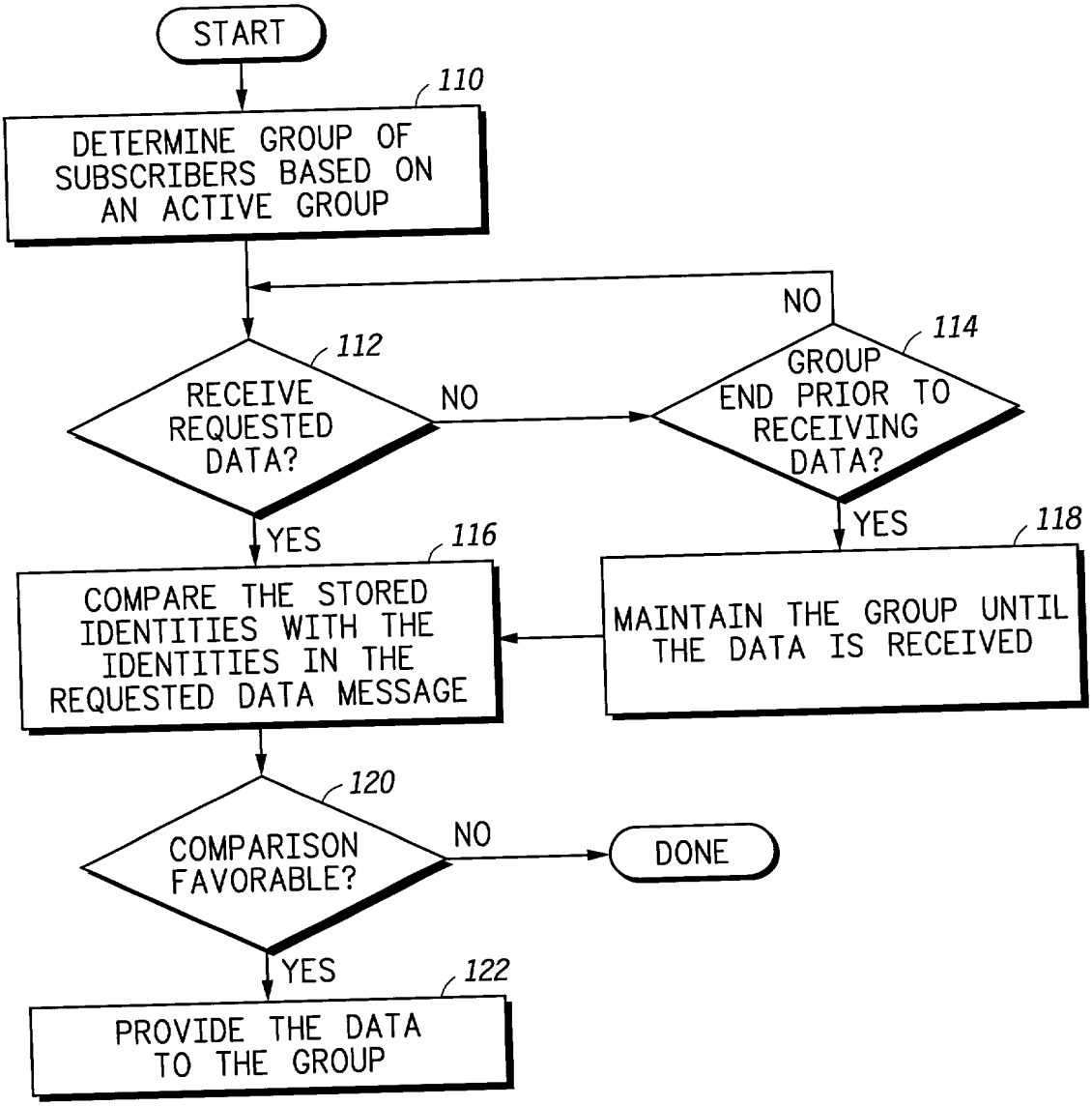
START
110
DETERMINE GROUP OF SUBSCRIBERS BASED ON AN ACTIVE GROUP
112
RECEIVE REQUESTED DATA?
NO
114
GROUP END PRIOR TO RECEIVING DATA?
NO
YES
YES
116
COMPARE THE STORED IDENTITIES WITH THE IDENTITIES IN THE REQUESTED DATA MESSAGE
118
MAINTAIN THE GROUP UNTIL THE DATA IS RECEIVED
120
COMPARISON FAVORABLE?
NO
DONE
YES
122
PROVIDE THE DATA TO THE GROUP

FIG.4

PATENT APPLICATION DECLARATION COMBINED
WITH POWER OF ATTORNEY

EXPRESS MAIL NO.: EH728060255US

_X_ REGULAR (UTILITY) OR ____ DESIGN APPLICATION
(check one)

Attorney Docket
No. CM03704H

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: METHOD AND APPARATUS FOR PROVIDING BROADCAST GROUP DATA, the specification of which:

(check one)

_X_ is attached hereto.

____ was filed on _____ as U.S. Application Serial No. _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

(check one)

_X_ no such applications filed.

____ such applications identified as follows:

(Serial No.)	(Country)	(Day/Month/Year Filed)	Priority Claimed Yes	No
(Serial No.)	(Country)	(Day/Month/Year Filed)	Yes	No
(Serial No.)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the priority benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which is material to the examination of this application and which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Prior U.S. Applications(s):

(check one) _X_ no such applications filed.

____ such applications identified as follows:

(Application Serial No.)	(Filing Date)	(Status) (Patented, Pending, Abandoned)
(Application Serial No.)	(Filing Date)	(Status) (Patented, Pending, Abandoned)
(Application Serial No.)	(Filing Date)	(Status) (Patented, Pending, Abandoned)

I hereby declare that: as to any claimed subject matter of this application which is common to my earlier United States or foreign application(s), if any, which I have identified above and claimed the benefit of priority thereof, I do not believe that the same was ever known or used in the United States before my invention thereof or patented or described in any printed publication in any country before my invention thereof or more than one year prior to the first of said earlier application(s), or in public use or on sale in the United States more than one year prior to the first of said earlier application(s), and that the said common subject matter has not been patented or made the subject of an inventor's certificate before the date of the first of said earlier U.S. application(s) in any country foreign to the United States on an application, filed by me or my legal representatives or assigns more than twelve months (six months if the present application is a Design patent application) prior to the first of said earlier U.S. application(s), if any; and that, as to any claimed subject matter of this application which is not common to said earlier application(s), if any, I do not know and do not believe that the same was ever known or used in the United States before my invention thereof or patented or described in any printed publication in any country before my invention thereof or more than one year prior to the date of this application, or in public use or on sale in the United States more than one year prior to the date of this application, and that said subject matter has not been patented or made the subject of an inventor's certificate in any country foreign to the United States on an application filed by me or my legal representatives or assigns more than twelve months (six months if the present application is a Design patent application) prior to the date of this application.

I HEREBY APPOINT THE FOLLOWING AS MY ATTORNEY(S) OR AGENT(S) WITH FULL POWER OF SUBSTITUTION TO PROSECUTE THIS APPLICATION AND TRANSACT ALL BUSINESS IN THE PATENT AND TRADEMARK OFFICE CONNECTED THEREWITH:

NAME(S)	REGISTRATION NO.(S)	ASSOCIATE POWER OF ATTORNEY ATTACHED
Raymond J. Warren	30,813	
Wayne J. Egan	33,168	
Jonathan P. Meyer	30,477	
James A. Coffing	36,485	
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Susan L. Lukasik	35,261	
Christopher P. Moreno	38,566	
George C. Pappas	35,065	____ Yes X No

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1303 East Algonquin Road
Schaumburg, IL 60196

Direct Telephone Calls to: (847) 576-5066

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statement and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's signature: Michael Korus

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Hoffman Estates (City) — Illinois (State or Country) — 60195 (Zip Code)

Full name of second inventor: None

Inventor's signature: ______

Date: ______

Residence: ______ City ______ State or Foreign Country

Citizenship: ______

Post Office Address: ______ Street Address

______ City ______ State or Country ______ Zip Code